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Gess

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[54] **APPARATUS FOR PRODUCING PACKAGES OF TWO WEBS OF VARYING LENGTHS AND WIDTHS**

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[51] **Int. Cl.**[3] **B65B 9/02;** B65B 51/02; B65B 59/00

[52] **U.S. Cl.** **53/553;** 53/383; 156/548; 493/478

[58] **Field of Search** 53/383, 553, 545, 546, 53/548; 493/220, 264, 266, 478, 479; 118/411, 412; 156/549, 548, 291, 107, 356, 357

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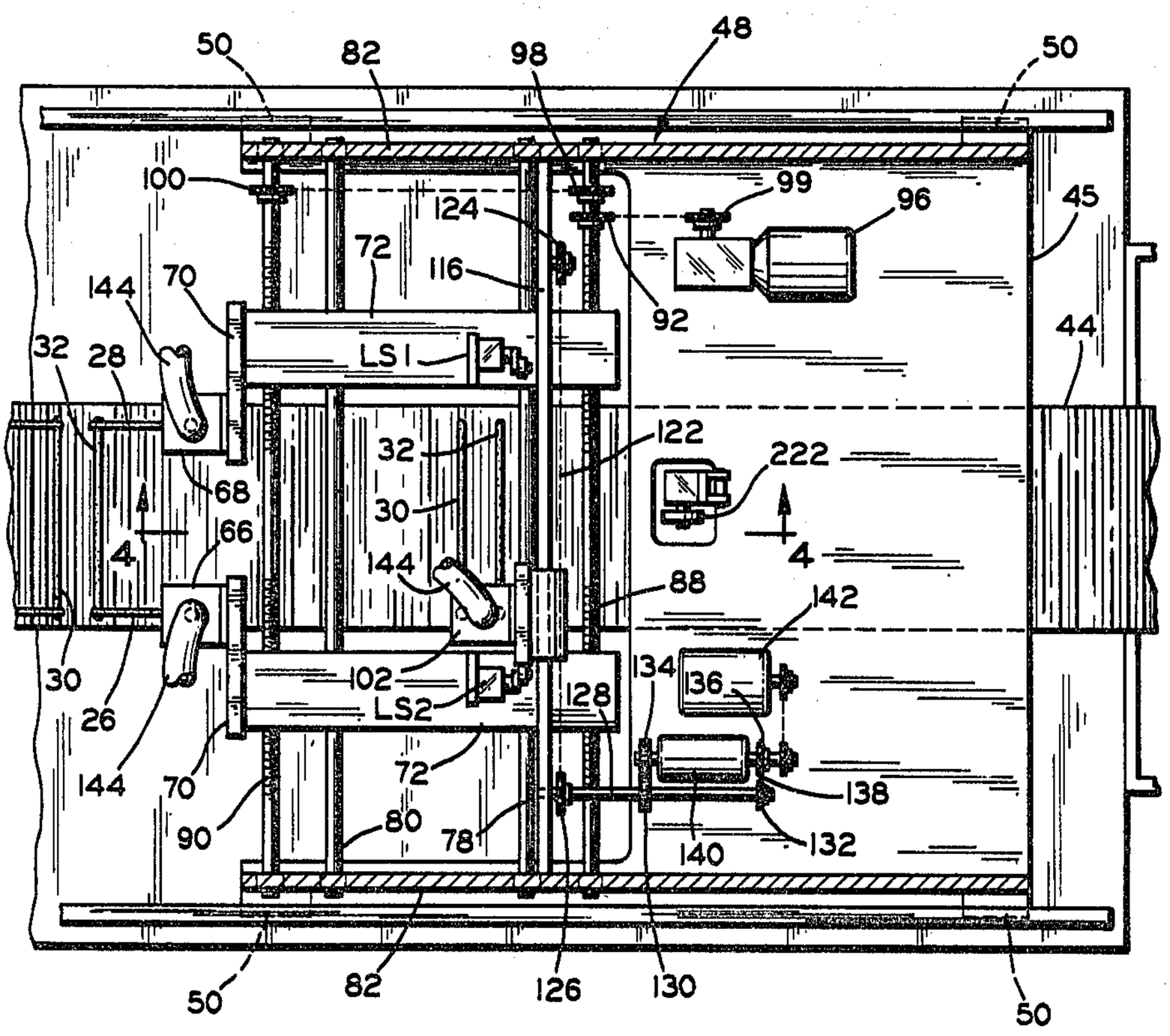
Primary Examiner—Nicholas P. Godici
Assistant Examiner—Charles L. Willis
Attorney, Agent, or Firm—Allen D. Gutchess, Jr.

[57] **ABSTRACT**

Packaging apparatus is provided for producing packages of various sizes. The package is of generally rectangular form and comprises two webs of packaging material which can be of a wide variety of lengths and widths. The packages have parallel longitudinal adhesive strips and parallel transverse adhesive strips joining the two webs of packaging material together. A lower continuous web of packaging material is fed longitudinally along a predetermined path and two separate applicator heads apply strips of adhesive material along edge portions of the web. Additional applicator heads, preferably combined as a single unit with two nozzles, apply transverse strips of adhesive material between the longitudinal strips when the web is stopped. After the object to be packaged is placed on the web in the area defined by the four adhesive strips, the second web of packaging material is applied over the first web and pressure means squeeze the two webs together along the four adhesive strips with the leading web portions then sheared to complete a package separated from the next package portion. The longitudinal applicator heads can be moved in and out relative to each other to provide packages of various widths and the stopping of the web and the application of the transverse adhesive strips can be controlled to vary the package length.

2 Claims, 11 Drawing Figures



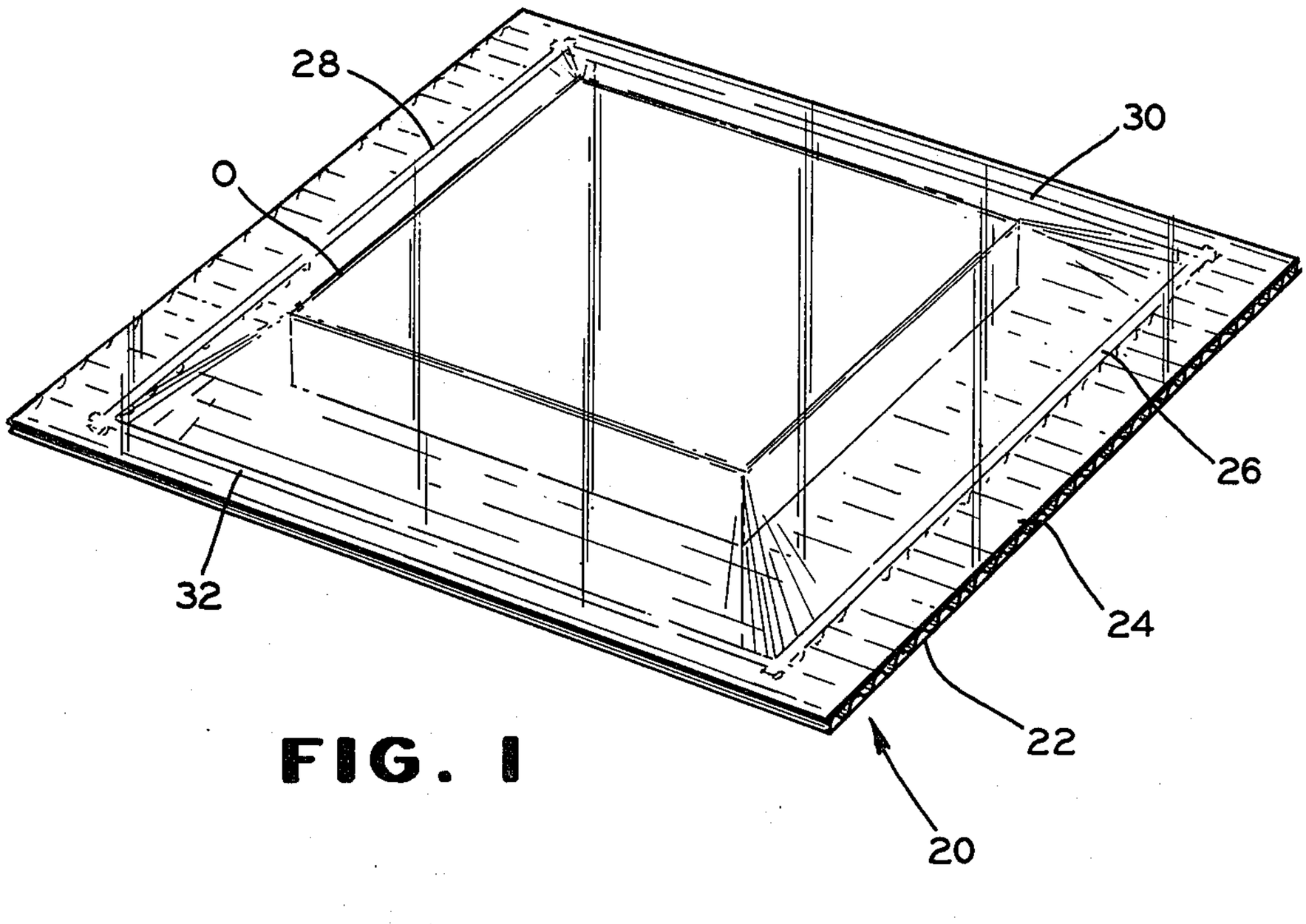
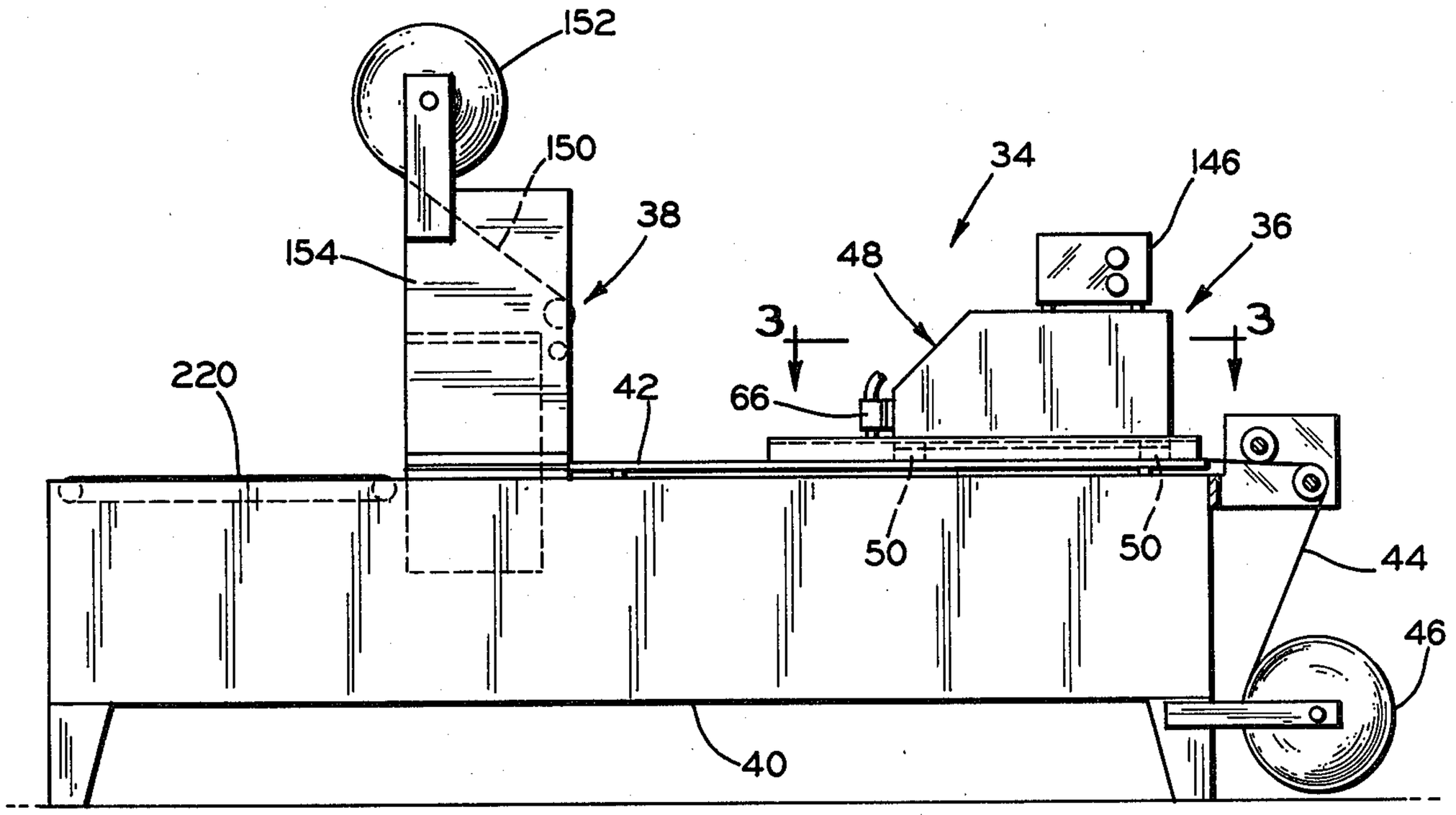

28
0
30
26
32
24
22
20

FIG. 1


152
150
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220
42
34
146
36
48
3
3
66
50
50
44
46
40

FIG. 2

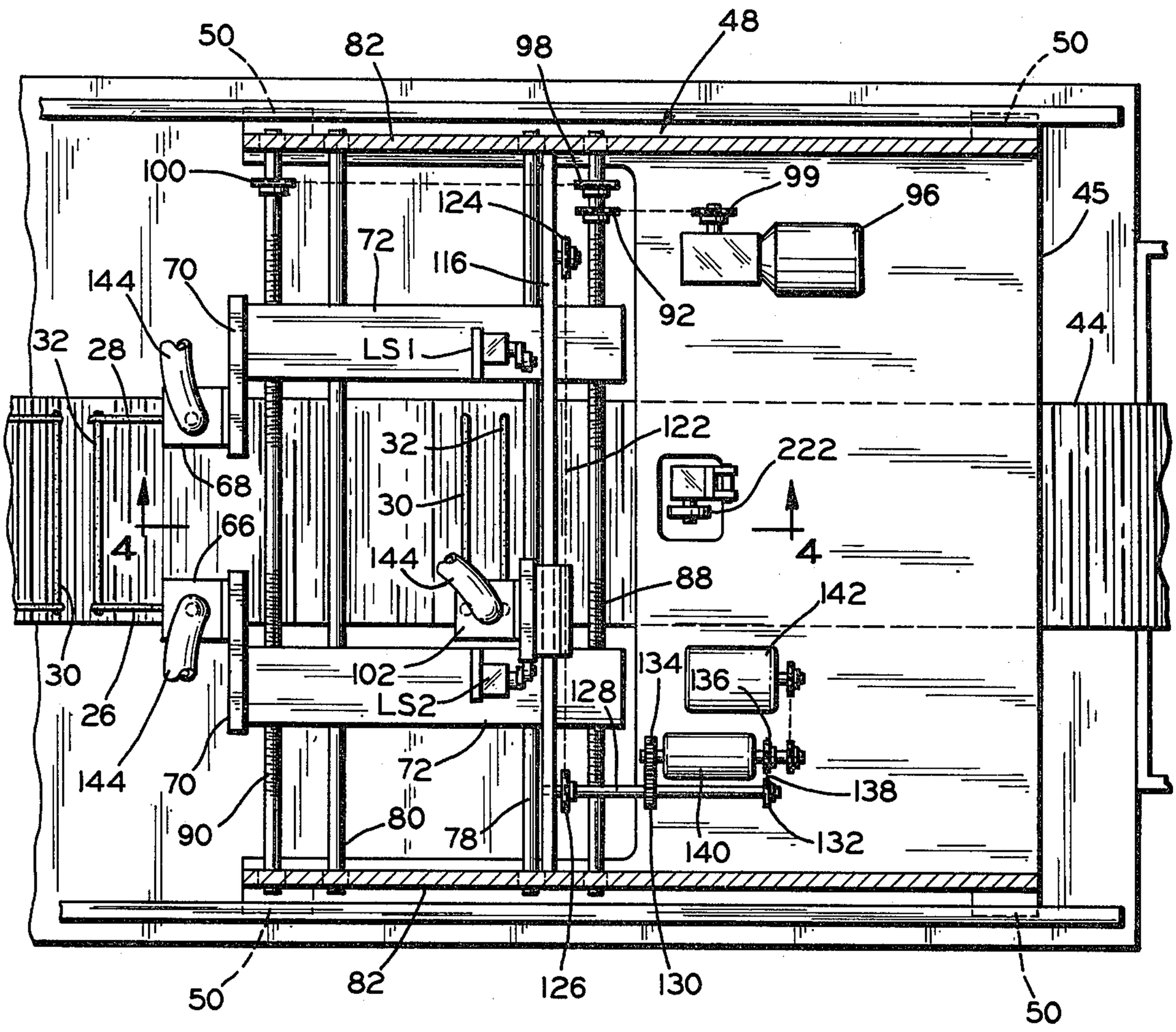
50
82
98
48
50
100
99
96
45
124
72
116
92
144
70
LS1
44
32
28
32
122
222
68
30
66
4
4
144
88
142
30
102
LS2
134
136
128
26
144
70
72
138
90
80
78
140
132
50
82
126
130
50

FIG. 3

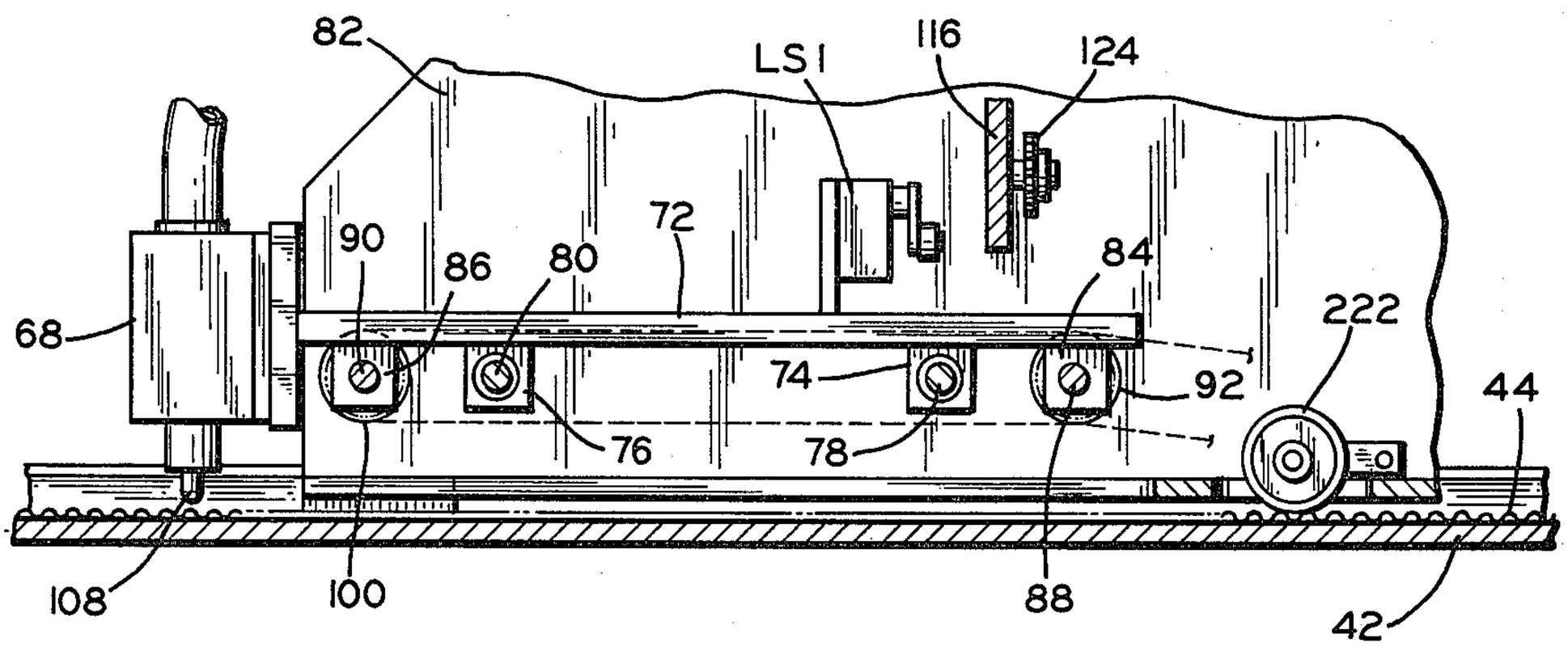
82
LS1
116
124
90
86
80
72
84
68
222
74
92
44
76
78
108
100
88
42

FIG. 4

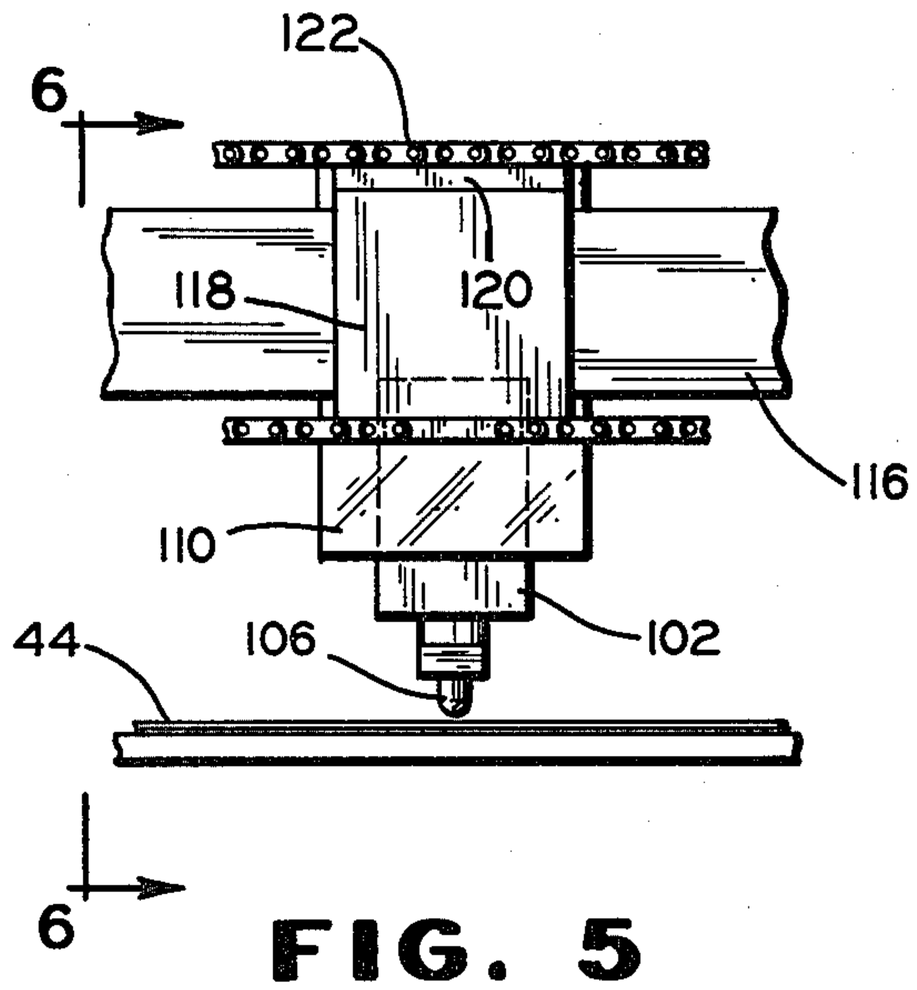

FIG. 5

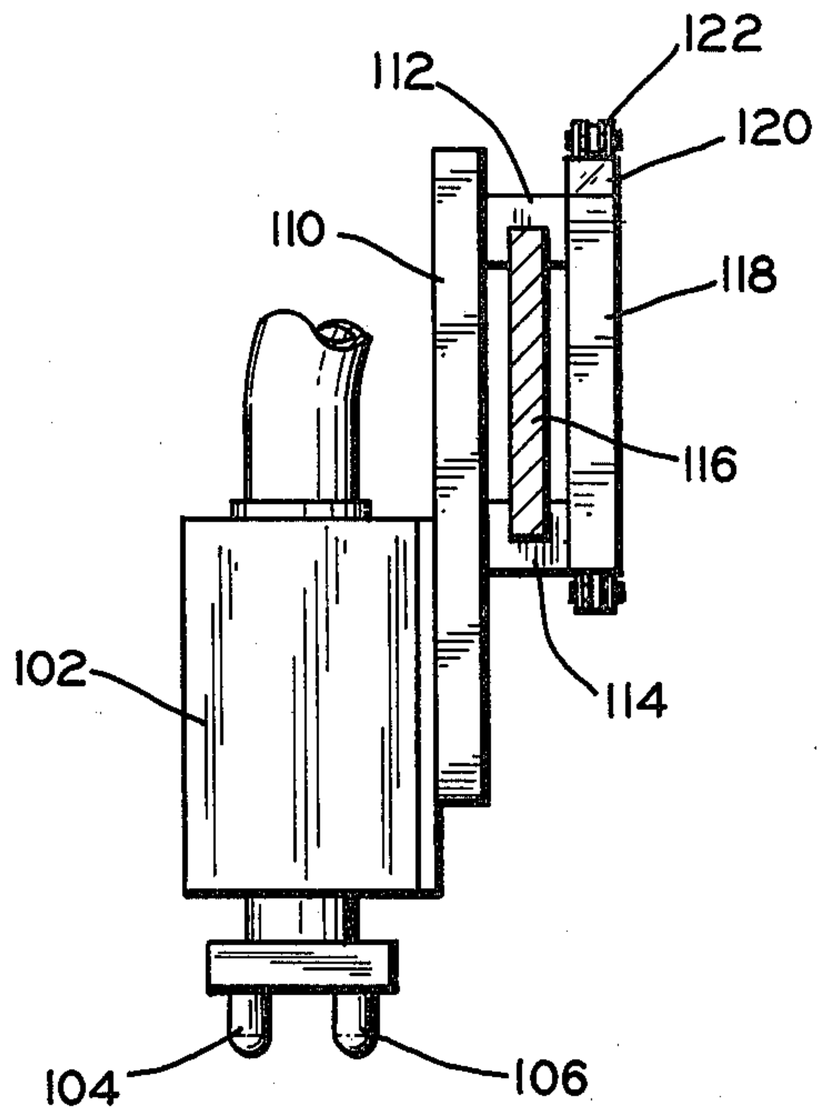

FIG. 6

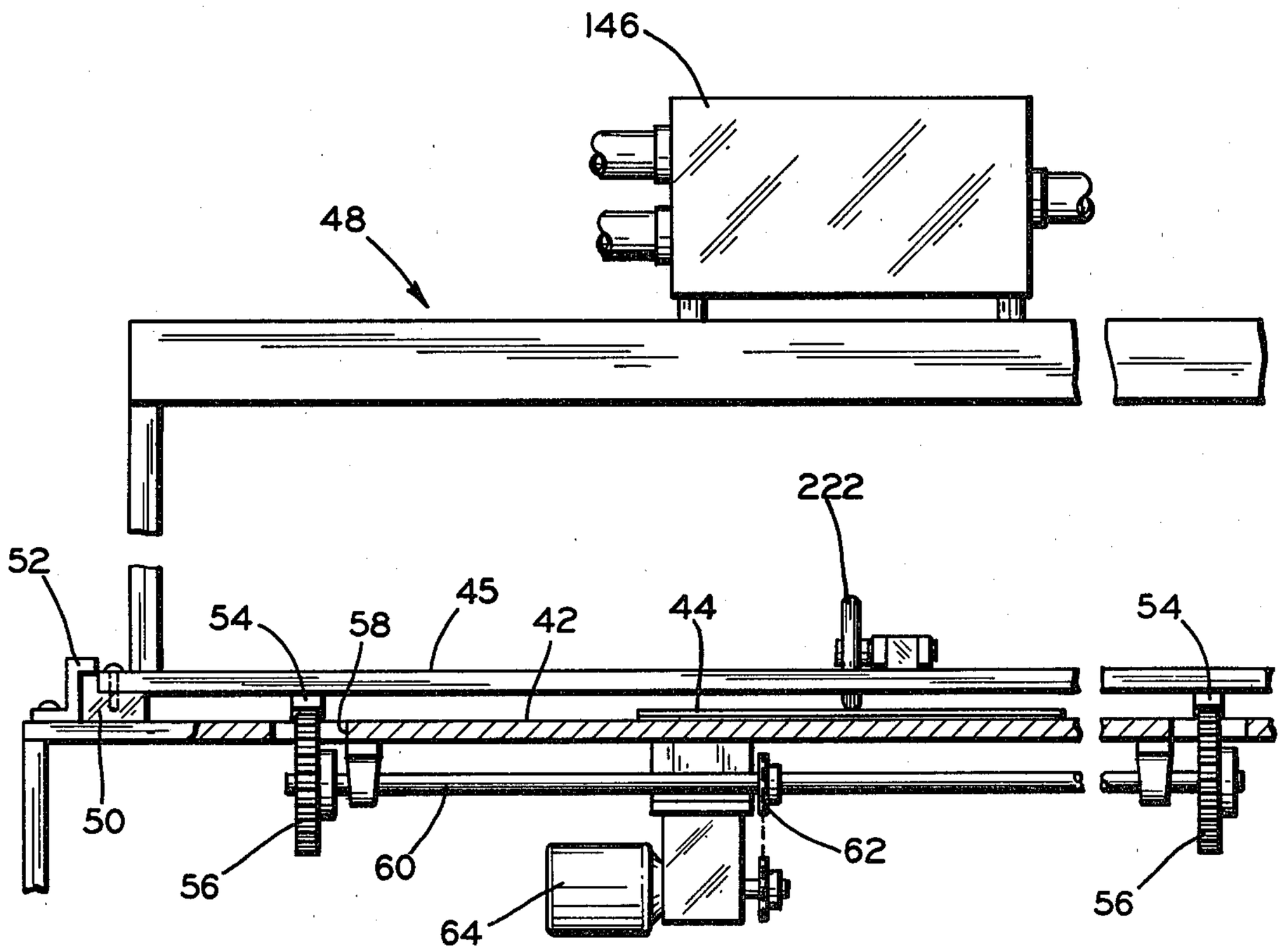

FIG. 7

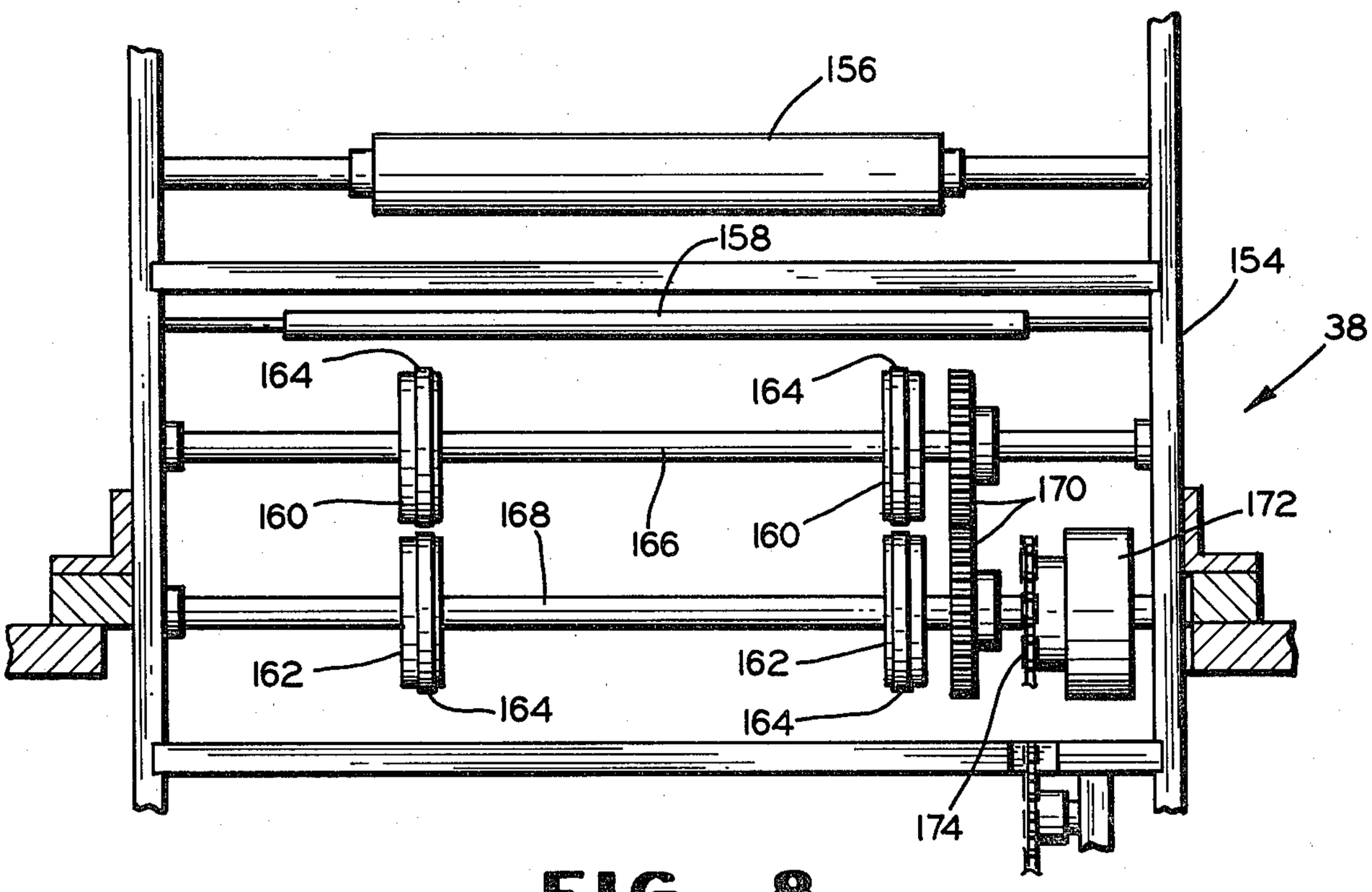
156
158
154
38
164
164
160
168
166
160
170
172
162
164
162
164
174

FIG. 8

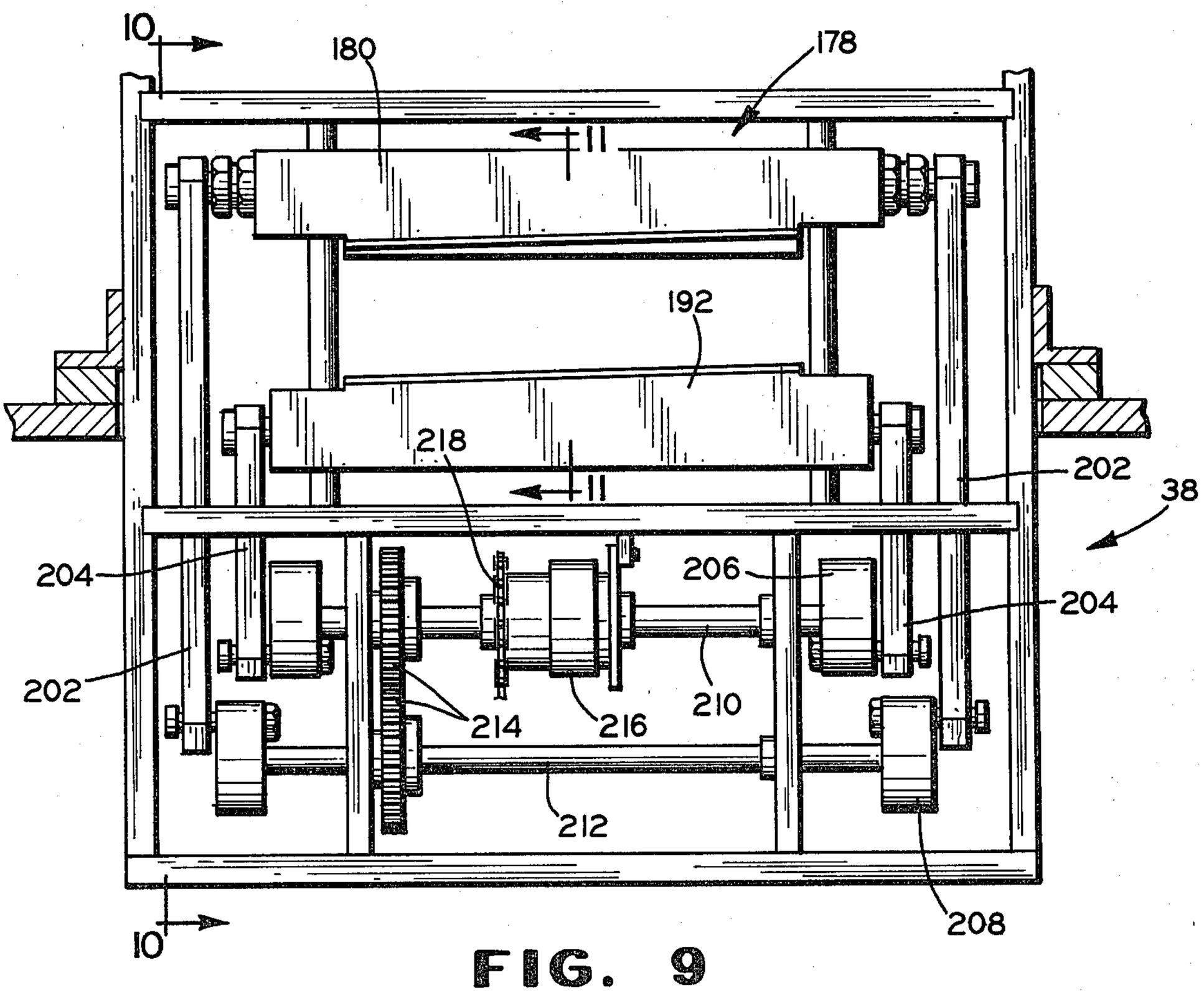
10
180
178
11
192
218
11
202
38
204
206
204
202
214
216
210
212
208
10

FIG. 9

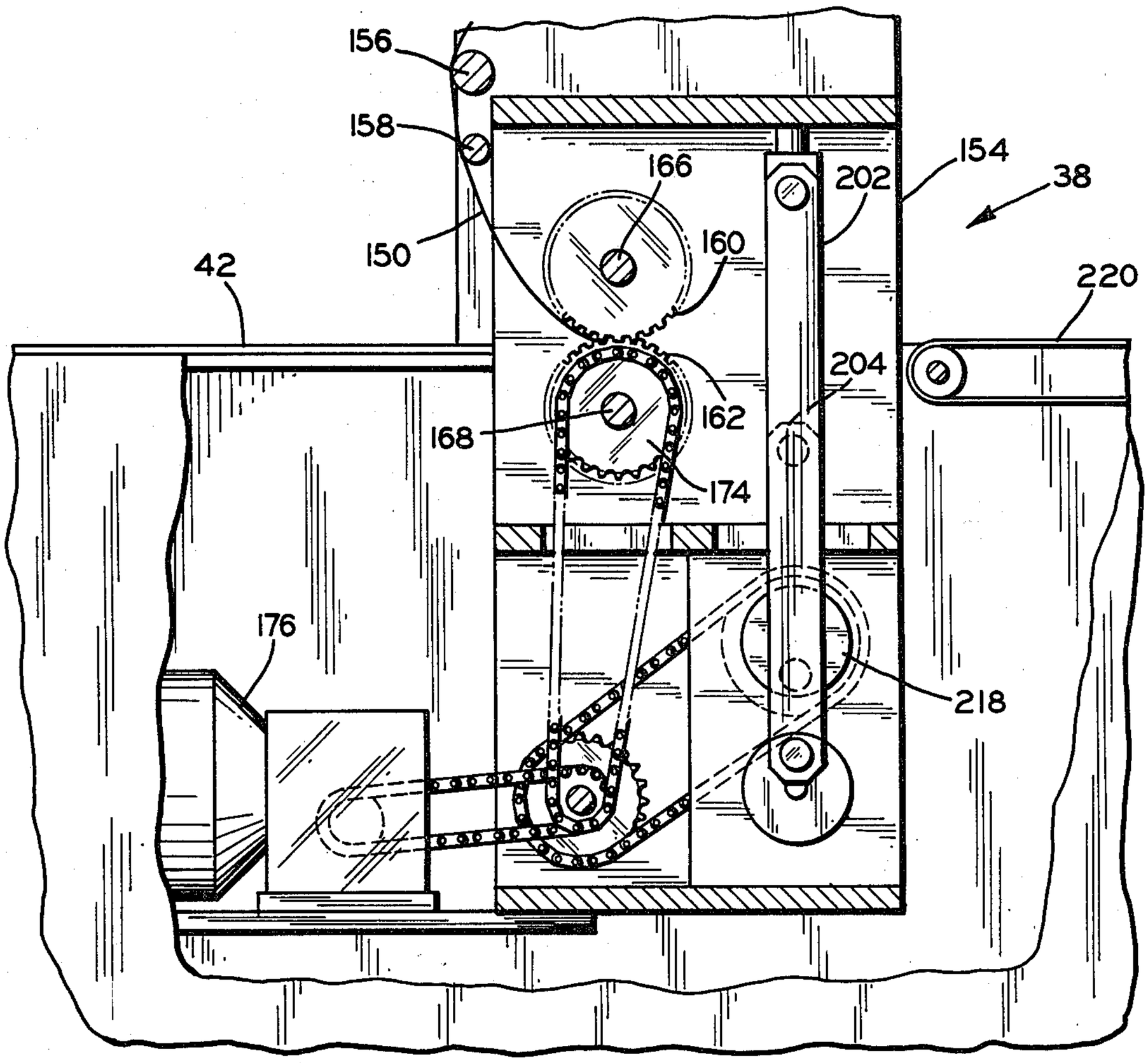
156
158
166
154
38
202
150
160
42
220
204
162
168
174
176
218

FIG. 10

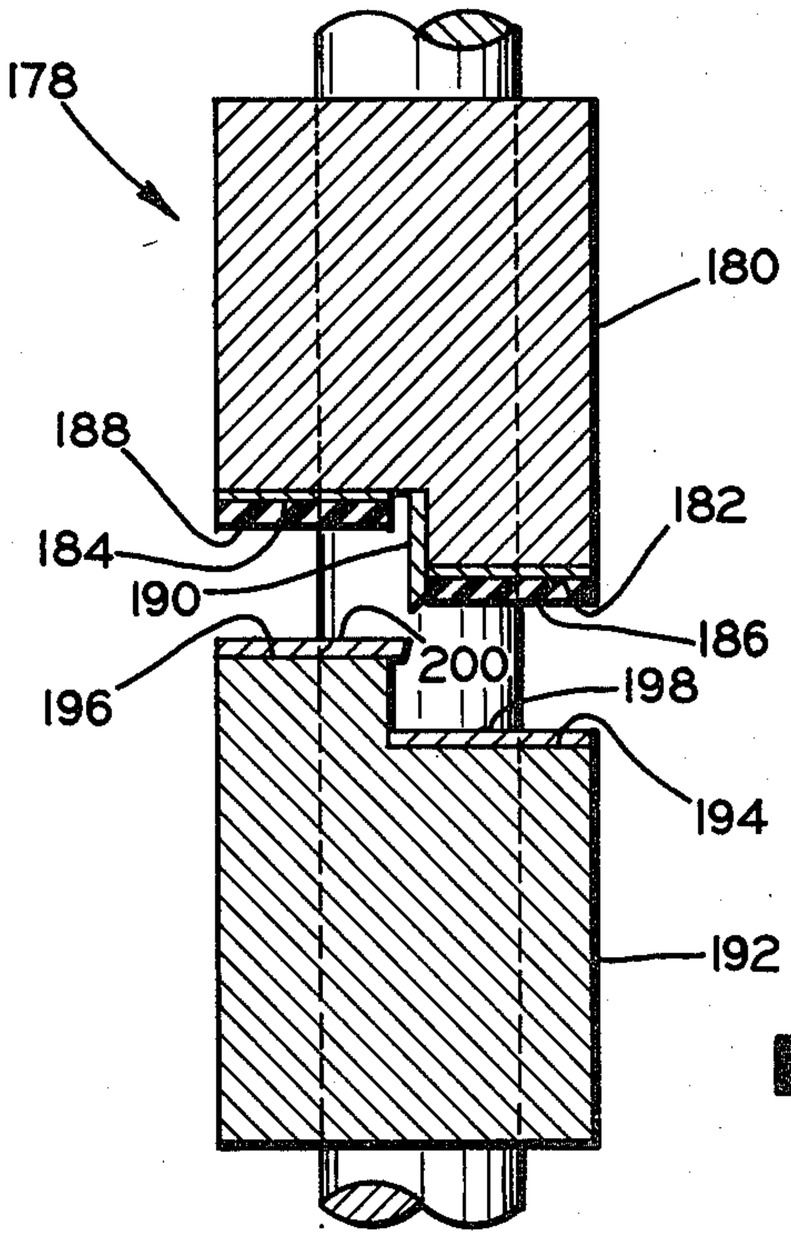
178
180
188
184
190
182
186
200
198
196
194
192

FIG. 11

APPARATUS FOR PRODUCING PACKAGES OF TWO WEBS OF VARYING LENGTHS AND WIDTHS

This invention relates to a package and to a packaging machine and method for producing generally rectangular packages of various lengths and widths from two webs of packaging material affixed together by adhesive strips.

While various packaging machines are known in the art, a packaging machine and method according to the invention are capable of producing generally rectangular packages of varying widths and lengths. The machine employs relatively simple controls by means of which the package size can be changed quickly to produce a desired size with minimum wasted set-up time. The machine also preferably employs hot melt adhesive with packaging materials which do not require cohesive coatings thereon, thereby resulting in less expensive packages.

The new machine employs a carriage which can be moved longitudinally of a bed of the machine. A first web of packaging material, such as conventional single-faced corrugated board, can be moved longitudinally along a bed of the machine with the carriage supporting first and second adhesive applicators along edge portions of the first packaging material web. These applicators can be moved in and out relative to each other and relative to a center line of the web to thereby determine the package width. Two additional applicator heads, preferably combined as a single unit, are supported by the carriage for transverse movement relative to the web, to apply transverse strips of adhesive thereto between the longitudinal strips. The carriage can be moved longitudinally relative to the bed of the machine to determine the position on the web on which the transverse strips are formed and the intervals at which the first web is stopped can also be controlled, thereby to control the length of the packages being formed.

The machine is also provided with pressure rolls for pressing together the two webs of packaging material at the longitudinal strips of adhesive after an object to be packaged is deposited on the first web within the area defined by the four adhesive strips and after the second web of packaging material is applied over the first web and the object thereon. Beyond the pressure rolls, the machine has a shear for shearing the leading package by severing the webs between the transverse strips, with the shear also being provided with pressure pads for applying pressure to the webs along the transverse adhesive strips during the shearing operation.

It is, therefore, a principal object of the invention to provide an improved packaging machine having the features and advantages discussed above.

Many other objects and advantages of the invention will be apparent from the following detailed description of a preferred embodiment thereof, reference being made to the accompanying drawings, in which:

FIG. **1** is a view in perspective of a completed package according to the invention;

FIG. **2** is a schematic side view in elevation of a machine for producing the package of FIG. **1**;

FIG. **3** is a fragmentary, enlarged view in horizontal cross section taken along the line **3—3** of FIG. **2**;

FIG. **4** is a fragmentary view in longitudinal cross section taken along the line **4—4** of FIG. **3**;

FIG. **5** is a fragmentary view in elevation of an adhesive applicator of the machine;

FIG. **6** is a view in transverse section taken along the line **6—6** of FIG. **5**;

FIG. **7** is a fragmentary end view of a carriage of the machine;

FIG. **8** is an end view of a pressing and shearing stand of the machine;

FIG. **9** is an opposite end view of the pressing and shearing stand of FIG. **8**;

FIG. **10** is a view in section taken along the line **10—10** of FIG. **9**; and

FIG. **11** is an enlarged view in transverse section taken generally along the line **11—11** of FIG. **9**.

Referring to FIG. **1**, a package in accordance with the invention is indicated at **20** and includes a lower sheet **22** of packaging material and an upper sheet **24** of packaging material between which is a packaged object O. The lower and upper sheets **22** and **24** are affixed together by longitudinal strips **26** and **28** or adhesive material and transverse strips **30** and **32** of adhesive material. In a specific form, the sheet **22** may be stiffer than the sheet **24** with the sheet **22** being of single-faced corrugated board having the corrugations facing upwardly and the sheet **24** being of clear plastic material. Most of the objects O to be packaged are generally of a somewhat flat nature, depending upon the degree of yieldability of the upper sheet **24**. The adhesive material forming the strips **26, 28, 30,** and **32** preferably is of the hot melt type but, in any event, the adhesive material eliminates the need for cohesive coated packaging sheets which are considerably more expensive than non-coated sheets. Depending upon the requirements, the sheets **22** and **24** can vary widely in width with the spacing of the longitudinal strips **26** and **28** of adhesive material varying accordingly. The length of the package can also vary widely, depending upon the spacing of the transverse strips **30** and **32** and the locations at which the sheets are sheared.

The package **20** is produced on the machine indicated at **34**. Basically, the machine includes an adhesive-applying station **36** (FIG. **2**) at which the longitudinal and transverse strips of adhesive material are applied and a pressing and shearing station **38** at which pressure is applied to the sheets **22** and **24** as the adhesive strips and the sheets are sheared. Objects to be packaged are deposited between the stations.

The machine **34** has a frame **40** and a bed **42**. A first web **44** of packaging material which constitutes the lower sheets **22** is fed from a spool **46** at a forward end of the machine to the first station **36**. The station **36** comprises a movable carriage or supporting housing **48** supported on the bed **42** by nylon blocks **50** or the like and guided for longitudinal movement relative to the bed **42** by side guides **52** (see FIG. **7** in particular). The carriage is moved longitudinally by suitable means. For this purpose, the carriage can have gear racks **54** extending longitudinally thereof and affixed to a lower surface of a base plate **45** of the carriage. The racks are engagable with spur gears **56** projecting upwardly through openings **58** in the bed **42**. The spur gears **56** are affixed to a shaft **60** which is rotated by a central sprocket **62** driven by a motor **64**. The operation of the motor **64** can be manually controlled to move the carriage back and forth relative to the bed **42** of the machine **34** to change the length of the package **20** being produced by changing the distance between the shear-

ing station **38** and a transverse strip applicator, which will be discussed more fully subsequently.

As the first or lower web **44** moves along the machine bed **42** and under the carriage **48**, the longitudinal strips **26** and **28** of adhesive are applied by applicators **66** and **68** (FIG. **3**). These are commercially available and, when the adhesive material is a hot melt glue, the applicators can be obtained from Nordson Corporation of Amherst, Ohio. The applicators are mounted on plates **70** which are affixed to elongate supporting members **72** extending parallel to the web **44**. The members **72** have depending bearing blocks **74** and **76** (FIG. **4**) which receive transverse guide rods **78** and **80** which are supported by side walls **82** (FIGS. **3** and **4**) of the carriage **48**. The supporting members **72** also have threaded ears **86** and **88** (FIG. **4**) which engage threaded rods **88** and **90**. These rods move the supporting members **72** equal distances in and out relative to the web **44** and the center line thereof when the rods are rotated. For this purpose, the rods **88** and **90** have end portions which are oppositely threaded. The rod **88** has a sprocket **92** thereon which is driven by a drive sprocket **94** and a motor **96**. When the rod **88** is turned, it turns the rod **90** an equal amount through sprockets **98** and **100**. The supporting members **72** have limit switches LS1 and LS2 mounted at intermediate portions thereof and which move in and out therewith, the purpose of which will be discussed subsequently.

The transverse strips **30** and **32** of the adhesive material are applied to the web **44** by another commercially-available applicator **102** which, in this instance, has two nozzles **104** and **106** which are similar to nozzles **108** (FIG. **4**) of the applicators **66** and **68** and which form the two transverse strips **30** and **32** of adhesive material simultaneously. The applicator **102** is mounted on a supporting plate **110** (FIG. **6**) having U-shaped bearing blocks **112** and **114** affixed thereto and engaging edge portions of a slide bar **116** which extends across the carriage and is supported by the side walls **82**. The sides of the guide blocks **112** and **114** opposite the plate **110** are affixed to a connecting plate **118** having a nylon bearing block **120** on the upper edge thereof.

The applicator **102** and the attached supporting and bearing plates and blocks are moved along the slide bar **116** by a chain **122**. The upper run on the chain **122** is slidably supported on the block **120** (see FIG. **5**) and the lower run of the chain has ends affixed to a lower portion of the connecting plate **118**. The chain has one portion engaged with an idler sprocket **124** (FIG. **3**) while the other end portion of the chain is engaged with a drive sprocket **126**. The drive sprocket **126** is mounted on a drive shaft **128** having a spur gear **130** and a sprocket **132** thereon. The spur gear **130** is engaged with a spur gear **134** and the sprocket **132** is connected with a sprocket **136** by a chain **138**. The gear **134** and the sprocket **136** are connected through an electromagnetic clutch **140** to a motor **142**. When the clutch **140** connects the motor **142** with the spur gear **134**, the chain **122** is driven in one direction, and when the clutch **140** connects the sprocket **136** with the motor **142**, the chain **122** is driven in the opposite direction.

The clutch and motor are controlled by the limit switches LS1 and LS2 so that when the applicator **102** engages one of the limit switches LS1 and LS2, the applicator is stopped until the web **44** advances a predetermind distance and stops once again, at which time the applicator **102** is moved in the opposite direction. Each time the applicator moves, it deposits the transverse strips **30** and **32** of adhesive material between the longitudinal strips **26** and **28** with the length of the strips **30** and **32** being controlled automatically by the positions of the limit switches LS1 and LS2 which, in turn, are controlled by the supporting members **72** and the spacing between the applicators **66** and **68**.

When the adhesive is in the nature of a hot melt glue, the adhesive can be supplied to the applicators **66**, **68**, and **102** through flexible hoses **144** from a source or heated pot **146** located on the top of the carriage **48**. The applicators have electrically-controlled, built-in valves to control the flow of adhesive through the nozzles **104–108**.

After the web **44** has the longitudinal and transverse strips **26–32** of adhesive material applied thereto, it moves through a space between the stations **36** and **38** where the object O to be packaged is deposited on the web **44** within the area outlined by the strips **26–32**. The web **44** then enters the station **38**, where pressure is applied to the webs on the adhesive strips and the package **20** is sheared from the leading edge to complete the package.

As the first web **42** with the adhesive strips and object thereon moves into the pressing and shearing station **38**, an upper, second web **150** of packaging material constituting the upper sheets **24** of the packages **20** is deposited thereon. This web is supplied from a spool **152** (FIG. **2**) mounted on a stand **154** of the station **38**. The second web **150** is fed around two guide rollers **156** and **158** and into contact with the lower web **44** as the two webs move between upper and lower pressure rolls **160** and **162** (FIGS. **8** and **10**) having resilient bands **164** on their peripheries. The rolls **160** and **162** are mounted for rotation on shafts **166** and **168** and can be longitudinally adjusted thereon so as to be in alignment with each other and with the longitudinal strips **26** and **28** of the adhesive material.

The upper rolls **160** and the lower rolls **162** are all driven and, in turn, move both the lower web **44** and the upper web **150** from their respective spools through the machine. The rolls can be driven through spur gears **170** (FIG. **8**) and an electromagnetic clutch-brake **172** on the shaft **168**. A sprocket **174** on the clutch-brake **172** is suitably driven through a motor **176** (FIG. **10**) with the pressure rolls **160** and **162** driven and stopped by the clutch-brake **172**.

Beyond the pressure rolls **160** and **162**, the webs move through a shear indicated at **178** in FIGS. **9** and **11**. The shear includes an upper block **180** having two downwardly offset pressure surfaces **182** and **184** carrying resilient pressure strips **186** and **188** with a shear blade **190** being located between the strips.

The shear **178** also includes a lower block **192** having two offset pressure surfaces **194** and **196** with metal strips **198** and **200** thereon, the strip **200** constituting a shear blade cooperating with the blade **190**. When the blocks **180** and **182** are moved together, the leading end portions of the webs **44** and **150** are severed to form the separate package **20**. At the same time, the blocks apply pressure to the transverse adhesive strips **30** and **32** to form the ends of the packages. The transverse strips **30** are squeezed between the strips **188** and **200** while the transverse strips **32** are squeezed between the strips **186** and **198**.

The blocks **180** and **192** are driven toward and away from one another by links **202** and **204** (FIG. **9**) connected by eccentrics **206** and **208** to shafts **210** and **212** which rotate together through spur gears **214**. The shaft

210 is driven through an electromagnetic clutch 216 by a sprocket 218 which is also driven through the same motor 176 which drives the pressure rolls 160 and 162. More details of the pressing and shearing station 38 are set forth in my U.S. pat. 4,064,792, issued on Dec. 27, 1977. After the shearing operation, the finished package 20 can be carried off the machine by a discharge conveyor 220 (FIGS. 2 and 10).

A sensor 222 (FIGS. 3, 4 and 7 is mounted on the base plate 45 of the carriage 48 and is in contact with the web 44 and is rotated as the web moves lineally. The sensor 222 can control the operation of the machine and various components through microprocessors or by more conventional electrical components such as relays, etc. When the web 44 has advanced a predetermined length as sensed by the sensor 222, the advancement of the webs 44 and 150 is stopped. This is accomplished by actuating the electromagnetic brake-clutch 172 to disconnect the shaft 168 from the drive and apply the brake to stop the rolls 160 and 162. At that time, the electromagnetic clutch 216 is energized to move the shear blocks 180 and 192 together to shear the foremost package and to squeeze the transverse strips 30 and 32 on each side of the shear line. The valves of the applicators 66 and 68 are shut off and the valve of the applicator 102 is opened. At this time, the motor 142 is also energized and the clutch 140 is actuated in a manner to drive the applicator 102 in the desired direction to apply the transverse strips 30 and 32 of adhesive material between the longitudinal strips 26 and 28. The applicator 102 travels until the other limit switch is engaged, which stops the motor and readies the applicator for the next transverse trip across the web 44.

It may be noted that when the web 44 is stopped, the applicators 66 and 68 for the longitudinal adhesive strips are stopped at an intermediate portion of the length of the package. When the web 44 is advanced again, the applicator 66 and 68 also begin to apply the longitudinal strips again and continue to do so until reaching the first transverse strip 30 of adhesive. These applicators are then temporarily shut off until reaching the transverse strip 32 at which time they again deposit the longitudinal strips of adhesive until the web 44 stops once more, at which time the applicators are again at intermediate portions of the package length. With this arrangement, the valves of the applicators 66 and 68 are open for a fixed length of time to deposit a longitudinal strip equal to the distance between the applicator nozzles 108 and the first transverse nozzle 104 of the applicator 102. The valves of the applicators 66 and 68 then shut off for a sufficient time to form a gap equal to the distance between the nozzles 104 and 106 of the applicator 102. These applicator valves then open up again until the web stops, as selected for the package length and controlled by the sensor 222. Consequently, each time the longitudinal applicators 66 and 68 are started, they deposit longitudinal strips of fixed distances, then form gaps of fixed distances, and then deposit additional longitudinal strips of varying distances according to the package length desired.

Various modifications of the above-described embodiment of the invention will be apparent to those skilled in the art and it is to be understood that such modifications can be made without departing from the scope of the invention if they are within the spirit and the tenor of the accompanying claims.

I claim:

1. Apparatus for making a package comprising a bed having a flat surface, means for guiding and moving a first web of packaging material in a longitudinal path along said surface, a supporting housing positioned on said bed and supported on the bed on each side of the first web, a first applicator for depositing a first strip of adhesive material longitudinally along an edge portion of the first web, a second applicator for depositing a second strip of adhesive material longitudinally along another edge portion of the first web, means supporting said first and said second applicators by said supporting housing, means for depositing a first transverse strip of adhesive material on the first web between the longitudinal strips and for depositing a second transverse strip of adhesive material on the first web between the longitudinal strips, means for depositing a second web of packaging material on the first web, means for pressing the two webs together, and means for severing the webs between adjacent transverse strips, said means supporting said first and second applicators comprising a first supporting member for said first applicator and a second supporting member for said second applicator, means carried by said supporting housing for moving said first supporting member and said second supporting member toward and away from one another substantially equal distances, means for moving said transverse strip depositing means across the first web, and means carried by each of said supporting members for reversing the movement of said moving means when engaged by said transverse strip depositing means.

2. Apparatus according to claim 1 characterized by said reversing means comprising limit switches engagable by said transverse strip depositing means.

* * * * *